REMARKS

Claims 1-12 have been examined, claims 1, 2, 4, 5, and 8 are amended, and claims 3, 6-7, and 9-12 are canceled herein. Accordingly, claims 1-2, 4-5, and 8 are now pending in the application. No new matter is introduced into the application by these amendments. Reexamination and reconsideration of all outstanding rejections and objections is requested.

The various claim objections noted by the examiner have been obviated by the present amendments to the claims.

Claims 6-7 and 11 are rejected under 35 U.S.C. §101. Those claims have been canceled.

Claims 1, 2, and 4-12 are rejected under 35 U.S.C. §102(b) as being anticipated by Habeck et al.

The present invention, as recited for example in claim 1, is a method including the step of transmitting an initial command from a supervisory device included in a ring of linked devices including the supervisory device and a plurality of port devices, with each device in the ring including an output and an input, with the input of each device in the ring coupled by an upstream link to the output of an upstream device in the ring and with the output of each device in the ring coupled by a downstream link to the input of a downstream device in the ring and with the initial command- having a device number field holding an initial value.

The initial command is received on the upstream link coupled to a port device and, when the command is received, a value held in the device number field is incremented and the initial command with an incremented value is transmitted on the downstream link coupled to the port device

Each port device initially outputs link messages on the downstream link coupled to each port device, with the link messages holding a link position value equal to a fixed value, and subsequently outputs link messages on the downstream link coupled to each port device, with the link messages holding a link position value equal to an incremented link position value where the incremented link position value is equal to the link position value received on the upstream link incremented by one.

The supervisory device stores a new link position value received on the upstream link coupled to the supervisory device and compares the new link position value to the number of devices in the ring to determine the location of a bad link in the ring of linked devices if the initial command is not received at the supervisory device before a time period expires.

The reference Habeck discloses that a number of switch boxes are connected in a chain so that the input of one switch box is connected to the output of the next, etc., until the output of the last switch box is connected back to the controller. The controller sends a command message to the first switch box which then executes the command and forwards the message on to the next switch box, etc., until the command returns to the controller. In this manner, the controller knows that all switch boxes have received the command. If the command does not return within a reasonable time, then the controller knows that one of the switch boxes or a control link may be faulty. The controller then sends the same command through the chain in the opposite direction. In this manner, all switch boxes will receive the command, except for the one that is faulty. (Abstract)

The first switch box to receive the message sets its own ID to the value in PP (which is zero), increments the value of PP (to 1), and then forwards the message to the next switch box. This message chain sets every switch box's ID. The controller, which receives the message back, knows how many switch boxes are in the chain by reading "PP. " (5:31)

FIG. 9 shows a message (referred to as a "ping " message) to diagnose connections. A switch box receiving the message checks the "PP " field for a match with its own ID. If the ID numbers do not match, the switch box forwards the message to the next switch box. If there is a match, then the switch box returns the message to the incoming link rather than forwarding it to the outgoing link. When the controller receives the message, it matches the sequence number and knows that the switch box with the ID of "PP " is active. (5:46-54)

To determine the location of a faulty link or switch, a controller sends the ping message (FIG. 9) to each of the switch boxes in its list. Processing continues to decision diamond 1018, where a determination is made whether the ping message has been received back from that specific switch box. If it has, then processing continues to action box 1020, where the switch box ID is incremented and then processing returns to action box 1016 where the ping message is sent to the next switch box.

If, in decision diamond 1018, the message has not been received back from a specific switch box, then processing continues to action box 1022, where the ping message is sent in the

other direction. In decision diamond 1024, a determination is made whether the message was received back. If it was, then processing proceeds to action box 1026, where the switch box ID number is decremented, and processing returns to action box 1022, where the ping message is sent to the next switch box. If, in decision diamond 1024, one of the switch boxes did not respond, the ID number is compared to the ID number of the switch box that did not respond in decision diamond 1018. If the ID number is the same, then an error is reported in box 1028 of a bad switch box. If the ID numbers differ by one, then the link between the two switch boxes is bad and an error is reported in box 1028. If the ID numbers differ by more than one, then multiple errors are likely (more than one switch box, more than one link, a switch box and a link, etc.), and are reported in box 1028. In this manner, the faulty unit(s) may be identified for easier maintenance.

The basic requirements for anticipation are set forth in MPEP §2131: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

The claimed feature that each port device initially outputs link messages on the downstream link coupled to each port device, with each link message holding a link position value equal to a fixed value, and subsequently outputs link messages on the downstream link coupled to each port device, with each link message holding a link position value equal to an incremented link position value, where the incremented link position value is equal to the link position value received on the upstream link incremented by one, is not found in Habeck.

As described above, in Habeck each processor increments PP in the command message similar to the processing of the initial message in claim 1. However, Habeck uses the ping procedure at the controller to locate a bad link by sending ping messages in sequence to each switch.

In contrast, in the method of claim 1 each port device initially outputs link messages with a link position value having an initial value, in the preferred embodiment of which the initial value is "0", and each port device subsequently outputs link messages with a link position value equal to an incremented value, where the incremented value is equal to the value received from the upstream port device incremented by one.

The link position value received at the supervisory device indicates the location of a bad link as shown by the examples in the specification. There is no need to use the complicated pinging process disclosed in Habeck. For example, for the ring depicted in Fig. 1, if the second serial link 18b is defective DEV2 does not receive a valid initial or link message. In this case, DEV2

will output a link message having a new link position field holding a value '0' since no valid link message is received on its upstream link. Note that this link message is output even though the upstream link is bad and no initial command is received This value will be incremented to '1' by DEV3 so that a link message having a new link position field holding the value '1' is received at the supervisory device (DEV0).

In this example, a new link field value of "1" indicates that the second serial link 18b is defective, and a new link field value of "0" indicates that the third serial link 18c is defective. If all links were good the supervisory device would receive "good value" of "3". If one of the links is bad the location of the bad link is indicated by the difference between the good value and the received value. In the above example, if the second link 18b is bad, then the received value of "2" identifies the second link 18b.

Accordingly, the link message steps recited in claim 1 are not expressly found in Habeck. Further, those steps are not inherent in Habeck because Habeck teaches a fundamentally different procedure for determining the identity of a bad link. In Habeck the switches only relay or reply to messages sent from the controller, i.e., a command message or a ping message. In the claimed system the port devices output link messages even if no message is received from the supervisory device.

Independent claims 4 and 8 recite similar limitations are those described above and are allowable for the same reasons as claim 1. Claims 2 and 5 are dependent claims that are also allowable for the same reasons.

Claim 3 is rejected under 35 U.S.C. §103(a) as being unpatentable over Habeck in view of Brown. Claim 3 has been cancelled.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (925) 944-3320.

Respectfully submitted,

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